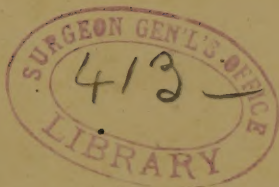


HOWE (LUKE)

The use and application of
an improved apparatus for
particular fractures and dis-
locations &c.



THE
USE AND APPLICATION
OF AN
IMPROVED APPARATUS
FOR PARTICULAR
FRACTURES AND DISLOCATIONS
OF THE EXTREMITIES, .

ILLUSTRATED BY CUTS AND CASES, WITH REMARKS.

✓
BY LUKE HOWE, M.D.

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1840.

THE

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BY J. H. HOWE, M.D.

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1851

APPARATUS FOR PARTICULAR

FRACTURES AND DISLOCATIONS

OF THE EXTREMITIES.

ANYTHING new in this branch of surgery may, perhaps, be considered as uncalled for, at this time, as the professional mind is pre-occupied by the many improvements in it which have recently been introduced into practice. It was the spirit of inquiry undoubtedly demanded by the subject, that has given origin to these improvements, and re-called into successful practice those inventions which had been permitted too long to slumber with the ashes of their authors. The present, then, may be the proper period to invite the professional attention to any supposed improvements on this subject.

It was correctly said by Mr. Liston, that "The possession of a good set of splints is not all that is wanted; the surgeon must have a head to know how to make use of them." The writer, on former occasions,* invited the attention of practitioners to some parts and modifications of his apparatus; and at this time an increased demand for them renders it desirable that their application should be more particularly described and illustrated, so that those who may possess, might "know how to use them."

Much credit is claimed for the "immovable apparatus," that it affords such security to the fractured limb, particularly the leg, that the patient can be safely indulged in movements in and out of the bed. Those who have witnessed the writer's cases under treatment for the fracture of the leg, or have made use of his apparatus, will bear testimony to the safety in which patients enjoyed this privilege, and to their freedom from pain in simple fractures. Should the writer's apparatus be honored by the approbation of practitioners, he does not expect it will share any better fate than the many other contrivances which have been invented and approved—tried and laid aside—to be forgotten with the memories of their authors.

* In his "Observations on the various methods of treating the fractures of the os femoris, with cases, in which a new apparatus was successfully used." N. E. Journal of Medicine and Surgery for 1824, No. 3, Vol. XIII. Also in a Dissertation on the Treatment of Dislocations and Fractures, read before the N. H. Medical Society at its annual meeting in 1827.

FRACTURE OF THE SHAFT AND NECK OF THE OS FEMORIS.

First Method. Apparatus.—A ratchet wheel, windlass and pulley (fig. 1), a gaiter, a leathern or paste-board case with straps, and a paste-

FIG. 1.

board splint shaped to the anterior third of the thigh. A narrow bedstead should be selected, and where a mattress is not to be had, as is generally the case

in the country, a straw bed which has been some time in use should be laid on boards fitted to the bedstead, and over this two or three soft and firm blankets and sheets should be spread.

Application.—Place the patient on his back in an extended position, taking care that his head be near the head of the bed, and his body and limbs equidistant from the sides of the bed and parallel to them; place thin pillows under the fractured limb, from the ischium to the heel; lace the gaiter on the ankle, having previously secured it from irritation, by covering the tendo-Achillis, the malleolæ, and instep, by cotton batting confined by bandage; spread a strip of cotton or linen cloth into the *thigh case*, broad enough to envelope the thigh; raise the limb and place the thigh case, thus lined, under the thigh; screw the windlass staff to the foot-piece of the bed; tie the cord of the windlass into the loop of the gaiter in the line of the axis of the limb; raise the foot of the bed from 4 to 8 inches, according to the power of extension which the case may require, to be supported by blocks or bricks under its posts; and now suspend a weight of from four to six pounds from the lever of the windlass. While extension is thus being made, soothing friction will dispose the muscles to relax. After a short time more force may be applied to the lever to the extent necessary for the coaptation of the fracture. When this has taken place, the lining cloth should be wrapped smoothly over the thigh, some soft compresses placed under the trochanter, and on other parts, where it may be required to prevent irritation—the paste-board splint laid on the fore part of the thigh, and the whole secured by buckling the thigh and pelvis straps. After this, the extending force should be lessened by removing some of the weight, or by slipping it to a notch on the lever

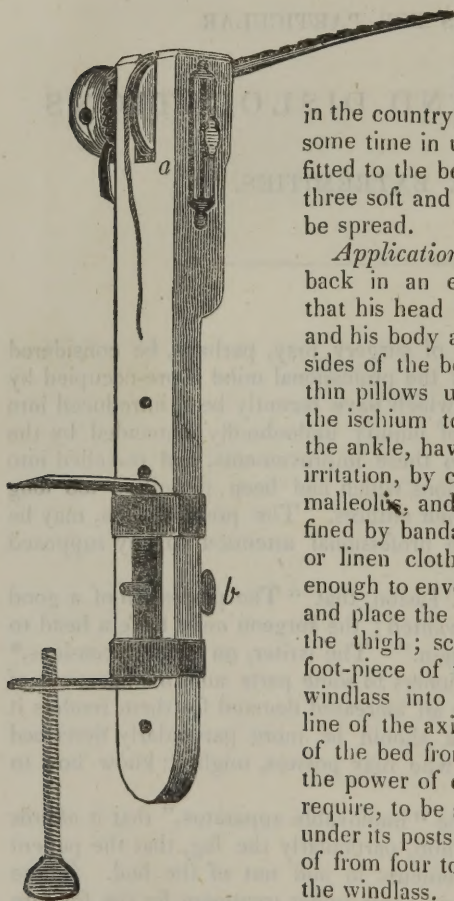


FIG. 1.—*a*, a small brass pulley, screwed to the side of the windlass staff. *b*, a pin to regulate the height of the windlass and pulley.

nearer the wheel, so as to produce no more extension than may be necessary, and can be borne without pain or considerable weariness.

On the second or third day, or at the first dressing, the weight may be removed from the lever of the windlass, and suspended over the brass pulley attached to the side of the windlass staff, as the weight or extending force obeys the motion of the body and limb better when made over the latter than by the former.

At this dressing the thigh straps may be unbuckled, and the anterior paste-board splint removed, so as to permit an examination of the state of the fracture. Accurate admeasurement should now be made between the anterior superior spinous process of the ilium and the internal ankle; as on this test depends very much the success of the treatment. A little allowance should be made for the stretching of the ligaments of the joints, so that the fractured should be found a little longer than the sound limb. After re-dressing, little more will be required than occasionally to tighten the straps as inflammation subsides, to keep the foot by proper supports from being everted, and to adjust the height of the pulley. If, however, the patient should complain of pain about the ankle, more compresses should be placed under the gaiter; if the limb be found too long, some of the weight should be removed; and if too short, more should be added.

The above treatment is all that is *necessary* to effect a perfect union in fractures both of the shaft and the neck of this bone. I have in two cases found it convenient to connect the pelvis-strap by a cord to the head-board, and buckle on the perineal strap ^{over} and soft compresses; and in one case, added connecting bands from the pelvis-strap to each side of the bedstead. But these additions were removed after a few days.

Under this treatment the only inconvenience the patient suffers is from the weariness of confinement, and even of this he does not complain after a few days. Under this uniform extension he should experience *no pain* in a simple fracture. If he does, it will be found, on admeasurement, that the inferior fragment of the fractured bone is retracted, and more weight in that case would be required, as pain at the fractured part almost invariably arises, in any mode of treatment, from deficient or unsteady extension.

When there is fracture of both the thigh and leg on the same side, as in one case in which I assisted the attendant surgeon in the early treatment, extension should be made from the ankle and also from a well-quilted and padded band laced on above the knee, by weights suspended over separate pullies.

The history of the many cases of the fracture of the shaft of the femur which have been successfully treated by the writer, according to the above method, would transcend the proper limits of this paper. He would only state that a similar treatment of four cases of the fracture of the neck of this bone resulted in perfect success.

The above mode of extension and counter-extension would probably be an important addition or improvement to the various kinds of apparatus in which extension is made by bandage or screw, and especially to "the immovable apparatus," before the bandage is dried, and even subsequently.

FIG. 2.

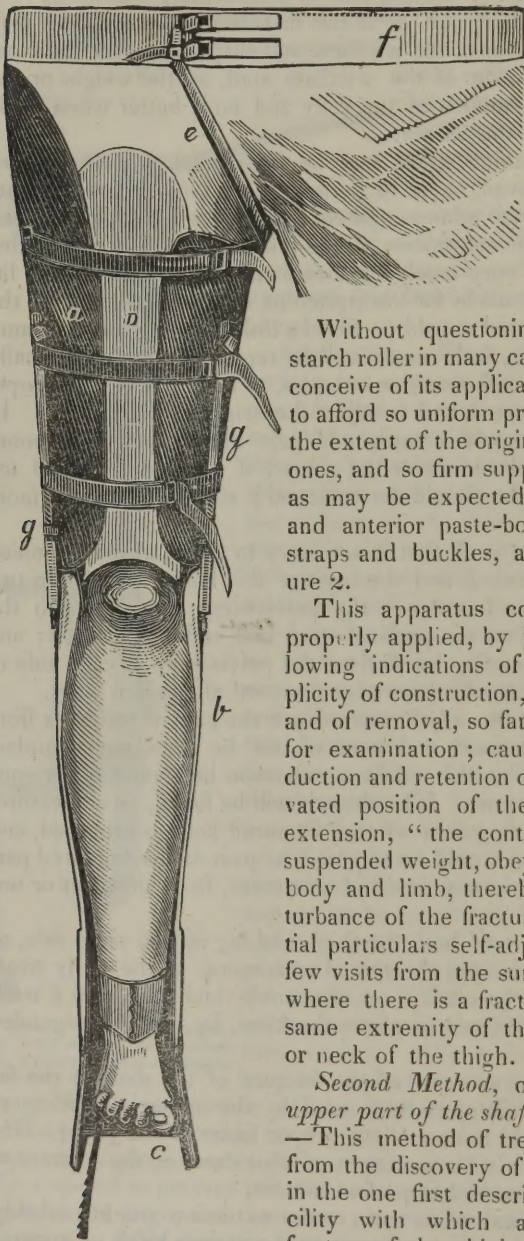


FIG. 2.—*a*, a leather splint or case, embracing the knee, trochanter and ilium, and nearly the circumference of the thigh, but leaving a space in proportion to its size on its anterior surface, for the paste-board splint, *D*. *g*, *g*, connecting irons, by the screws and thumb-nuts of which, the apparatus is adapted to the length of the limb, and extension, in certain cases, made. *b*, the leg splint, as represented in fig. 3, before the roller is applied. *c*, the ratchet-wheel windlass, which is connected with the gaiter by a cord. *e*, *f*, the perineal and pelvic straps.

Without questioning the utility of the starch roller in many cases of fracture, I cannot conceive of its application to the thigh, so as to afford so uniform pressure to its muscles, to the extent of the origin of the most powerful ones, and so firm support to the trochanters, as may be expected by the *leathern-case* and anterior paste-board splint, confined by straps and buckles, as may be seen in figure 2.

This apparatus commends itself, when properly applied, by its answering the following indications of treatment: viz., simplicity of construction, facility of application, and of removal, so far as may be necessary for examination; causing no pain in the reduction and retention of the fracture; the elevated position of the limb; the means of extension, “the continued effort” of the suspended weight, obeying the motions of the body and limb, thereby preventing the disturbance of the fracture; being in all essential particulars self-adjusting, requiring but a few visits from the surgeon; and admissible where there is a fracture of the leg on the same extremity of the fracture of the shaft or neck of the thigh.

Second Method, or Apparatus for the upper part of the shaft of the femur (fig. 2).

—This method of treatment did not result from the discovery of any important defect in the one first described, but from the facility with which an apparatus for the fracture of the thigh can be formed by the

union of the *posterior-concave splint* (fig. 3) with the *leathern-case* of the thigh, by *uniting-slides* at the knee, without any other addition to

the apparatus, so as to afford any amount of extending or counter-extending power that the case might require, without causing irritation of the parts to which it is applied.

Application.—Place the extended limb into the apparatus, having prepared the thigh-case and leg-splint as before described; adjust the apparatus to the length and natural direction of the limb by turning the thumb-nuts of the slides; place the gaiter on the ankle, into the loop of which, tie the cord of the windlass; buckle the pelvic and perineal straps, the latter over soft compresses; and now make the necessary extension, by turning the windlass by the lever. When coaptation of the fracture has taken place, apply the paste-board splint to the forepart of the thigh, and buckle the thigh straps over all. To counteract the shortening of the limb by the relaxation of any part of the apparatus, a small weight should be suspended from the lever for a few of the first days of treatment. The foot of the bed should be raised as in the first method; and should the perineal band cause irritation, a weight should be suspended over the pulley, as in the first method, the cord being connected with the loop at the lower end of the leg or thigh-splints. In this way we can adjust the force of the extension to the contractile power of the muscles, and can apply it to one or more parts of the limb where it can be best borne by the patient; and thus avail ourselves of two forces of extension, and two of counter-extension, in cases where they may be desirable. A roller should be applied to the foot and leg over the splint; and, to complete the dressing, the usual inverted cradle or hoops should be placed over them to prevent the eversion of the foot by the pressure of the bed-clothes.

By whatever method a fracture of the femur may be treated, the limb should be gradually flexed at the knee after removing the extension, and before removing the patient from the bed, by placing under it pillows or other sufficient support; and should extension be found necessary at this stage of treatment, it can be conveniently made while the extremity is in a flexed position, by turning down the thumb-nuts of the connecting slides—thus forcing the tubes of the screws against the staples of the upper extremity of the leg-splint, causing pressure of the splint against the calf of the leg, and consequently extension of the thigh.

Where the flexed position of the limb should be preferred in the management of a fractured femur, this apparatus would form a convenient double inclined plane, by which extension could be graduated by the screw, much more conveniently than by the weight of the body.

Extension may be removed in cases of the fracture of the shaft of the femur, from four to six weeks after the date of the accident; and in those of the neck, not until about eight or ten weeks. Flexion and occasional motion should be given to the limb, for about a week before the patient is permitted to leave, or is taken from his bed.

FRACTURES OF THE LEG.

First. Oblique fracture of the tibia and fibula. Apparatus.—The posterior-concave splint (fig. 3). The garter, with the fobs, a gaiter and roller.

Application.—Lace the garter on below the knee and the gaiter on the ankle, securing the tendons from unequal pressure of both by soft compresses; adapt the splint to the sound limb, over batting or compresses, where they be necessary to give it a uniform support; then adjust the splint to the fractured leg; slip the fobs over the extended ears of the splint, *b, b*;

FIG. 3.

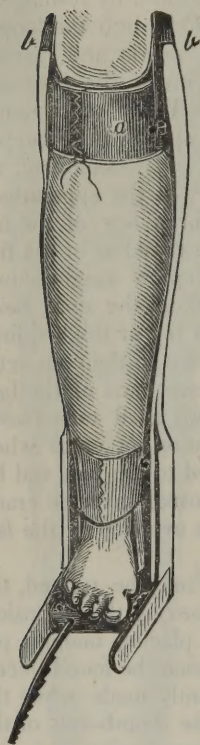


FIG. 3.—*a*, the laced garter. *b, b*, the fobs on the extended lateral portions of the splint, connected to the garter by straps and buckles. The construction of this splint is similar to fig. 4, excepting the excavation for the heel, and the corresponding flat surface under it, are longer; and the addition of the ratchet-wheel windlass.

buckle the straps of the fobs to the garter, and tie the cord of the windlass to the strap of the gaiter. Now make extension by turning the windlass by the lever, slowly and gradually, till coaptation has been found to have perfectly taken place. Then apply the roller over the foot and leg, having placed compresses on the inner side of the tibia, to give all parts an equal support, and preserve the natural shape of the limb. The foot may be supported at its proper angle with the leg by a piece of roller being passed round it and pinned to the dressing near the knee. All pain is removed from the moment extension is made, and will not return unless shortening of the leg is permitted by the slipping and stretching of some parts of the apparatus. To prevent this, a small weight should be suspended from the lever during the first twenty-four hours of treatment. After this, the necessary extension being retained by the windlass and ratchet-wheel, the patient may be permitted to leave his bed, sit in a chair, walk on crutches, and even ride in an easy carriage, without risk of displacing the fracture or retarding its union.

Second. Transverse fracture of one or both bones of the leg. Apparatus.—The posterior-concave splint (fig. 4). A piece of cotton cloth of the length of the leg, and a little wider than its circumference, compresses and a roller.

Application.—Adjust the splint to the sound leg, as in the first method, over necessary compresses; lay the cloth smoothly over the splint; raise the fractured limb, and bring the splint up to its place, then let the leg and splint settle down on pillows; bring the cloth up on each side and wrap it smoothly over the anterior part of the leg; and apply the roller to the foot and over the leg and splint. It is convenient to have separate rollers for the foot and leg. The foot may be supported by a strip of cloth or roller being carried round the foot-pieces of the splint and the foot, or round but one of the foot-pieces, if it be necessary to give the foot an inclination outward or inward. Compresses should be interposed between them and the foot, to prevent irritation; between

the splint and the leg where there is space to admit them, particularly at the tibial side ; and where they may be necessary.

I have practised this or a similar method of treatment of the fractures of the leg during the last fifteen years, and have ever permitted the patient to enjoy the privilege of leaving the bed and sitting in his chair, resting his leg over an inclined plane or some other convenient support. Even in a very bad compound dislocation of the tibia and fracture of the fibula, the leg being supported by this splint, the patient was daily taken from the bed for the purpose of admitting of more convenient dressings of the wound, without any disturbance of the wound or fracture.

During the above time I have tried various materials in the construction of splints of a similar form : viz., sole-leather, book-binders' paste-board, sheet zinc, and a composition of paper and cotton cloth cemented by a paste of flour and starch, or a solution of gum arabic, &c. These were shaped on moulds of the form of the leg, also of the thigh and upper extremities. These form very convenient and firm splints for the latter, and for the former excepting where both bones of the leg are fractured, accompanied with much inflammation and swelling, in which case the necessary fomentations and lotions cannot be used without injury to the texture of such splints. For these and other reasons the wooden splint (fig. 4) is to be preferred in fractures of both bones of the leg. It affords an unyielding, uniform support to the limb, prevents the depression of the heel and consequent anterior curvature of the tibia, sometimes called, though improperly, the rising of the bone, and by compressing the large posterior muscles of the leg, restrains their contractions. The broad base of the lower part of the splint prevents the rotation of the leg or eversion of the foot, when the patient is lying in bed or sitting in the chair. Indeed, it would seem that this splint combines those qualifications which have, it has been said, "been long a desideratum : " viz., "a cheap, simple and efficient splint, in which a broken leg could be placed, adjusted and secured during the time necessary for the completion of the process of union, and which would admit of the removal of the bandage for the purpose of attending to the state of the soft parts."

Notwithstanding I have found the common roller sufficient to confine the splint to the leg and secure the fracture from displacement, I have sometimes applied a splint of book-binders' pasteboard, moistened, to

FIG. 4.



the anterior part of the leg, cut to the length and breadth of it, not covered by the posterior splint; which, when dry, together with the rest of the apparatus, forms a neat and unyielding case for the limb.

I am aware that further remarks on the application of this splint must be made at the risk of being thought tedious, but as the "immovable apparatus" is highly applauded by the profession in some hospitals and cities, I will take the liberty to suggest some further modifications of my apparatus, which cannot fail to fulfil the indications of treatment which are said to be so effectually done by the starch bandage, and some which this does not.

One of the most important indications is a speedy reduction of the fracture. The first days of the treatment are as important in removing irritation and consequent pain and inflammation, as the last weeks are to insure a perfect limb; and a surgeon in private practice, especially in the country, who should do nothing effectually for the relief of his patient in the former, might sometimes experience the mortification of finding him in the care of another, in the latter period. The "immovable apparatus" cannot always be applied till some days after the accident; and when it is, it forms no sufficient support till the third day of its application. The posterior-concave splint can be applied at the earliest stage of treatment, and will afford a uniform support to the limb, and every facility, by position, fomentations, lotions, &c., for the removal of inflammation. After this, should it be desirable, in addition to the advantages of this splint, we may avail ourselves of those of the "immovable apparatus" in the following manner. After applying the common roller, as has been above described, moisten that part of it which comes in contact with the leg and foot with the "albumen" of Scultetus, the "oxycerate cum alb. ovor." of Turner, the "glue, varnish, paste of eggs, sugar and flour," &c., of J. Bell, or the "solution of starch" of Sutin. Then the second and third roller may be added, the same part of each being saturated with the one of the above articles used for the first. I have found Alfred Sweet's "composition* for moulding tablets for fractures," made excellent splints or cases to enclose the fractured upper extremities; and it would be a very convenient substitute for the above articles. When the bandage on which has been spread either of the above solutions, has become dried, it should be slit open on the edge of the splint on each side, and at the edge of each foot-piece. A dry or an adhesive roller may now be cast over the splint, and that portion of the rollers which has thus been formed into a firm tablet. The limb is now completely encased with so much firmness as to enable the patient to walk with crutches without any hazard of disturbing the fracture. The tablet can be removed for the purpose of examination as often as it may be desirable, and replaced with the greatest facility.

Plaster of Paris, or stucco, which has for more than a century been used in Arabia, in the treatment of fractures, and recently in France, might be used as a convenient auxiliary in the application of this splint. After the splint is properly adjusted to the limb, lay a piece of cotton or

* This composition is made by rubbing whiting with the mucilage of gum Arabic.—Lancet, and Bell's Medical Library, Vol. III., No. 9.

FIG. 1



FIG. 2



FIG. 3



linen cloth over the fore part of the leg and upper part of the foot, so wide that the edges may hang over each side of the splint; cut slits at the ankle so that the cloth may lie smoothly; then with the hand cover the cloth with the plaster, insinuating it into any space there may be between the splint and leg, by pressing it down within the doublings of the cloth. In a few minutes the stucco is dry, and the leg encased, and though the swelling of the limb would raise the stucco tablet, the firmness of the latter would greatly resist the retraction of the bones. This tablet could be raised from the limb for the purpose of examination, by gently lifting at the edges of the cloth. On being replaced, it should be confined by common or elastic straps.

The first use I made of the posterior splint (fig. 4), in a simple fracture of the leg, was in the case of Mrs. J. Cutter, who, on the 3d of January, 1826, slipped from the door-step and fractured both bones of the leg at the lower third. The fracture was reduced in half an hour after, and the splint applied. On account of her experiencing considerable pain, moderate extension was made from the ankle by a suspended weight, and continued 24 hours, which gave instant relief; the pain did not recur after removing the extension. After this she was allowed to leave her bed daily, and to sit in her chair with her leg placed over a convenient stool. Feb. 4th. A perfect union.

The success of this case induced me to continue a similar but sometimes modified practice in all subsequent fractures of the leg. And I am gratified to learn that equal success has attended the use of this apparatus by those who have condescended to give it a fair trial. A few cases with which my friends have kindly favored me, will sufficiently illustrate the advantages of this splint, without adding others in my own practice.

Extract of a Letter from James Batcheller, M.D., of Marlborough.—"E. Cudworth had a fracture of the tibia and fibula about four inches above the ankle-joint, with much displacement. I applied your *posterior-concave* splint, and the result exceeded my most sanguine expectations. The patient was enabled to leave his bed every day; on the 17th from the accident, by the aid of crutches, he walked to his neighbor's, some sixty or seventy rods. No displacement occurred. I removed the splint about the thirty-fifth day; union of the fracture, and free from deformity."

"Lemuel Parker, nine years of age. Fracture of his leg. I applied your splint, as in the above case, with equal success. He was removed from the bed to his chair whenever he desired it, every day. Splint removed 30th day. The fracture well united and free from deformity."

Dr. B.'s expressions of high commendation of this splint are here omitted.

Extract of a Letter from Asahel D. Shurtleff, M.D., of Rindge.—"I have used your posterior-concave splint in a case of the fracture of the tibia and fibula. David Howe, of Rindge, on the 15th of Nov.,

1831, fell from a waggon and fractured his leg about four inches below the knee-joint. I applied your splint; he was able to get about his room on crutches and sit in his chair during the treatment; I did not see him but three times after the first dressing; the limb is perfect.

"I have also used your method of the treatment of fractures of the femur by the pulley and weight, with success. I think the patient suffers much less pain by this than by other methods, as one patient informed me that he had not lost an hour's sleep from pain."

From Silas Cummings, M.D., of Fitzwilliam.—"The first case in which I used your apparatus was that of a man aged 50 years, Feb. 6th, 1827. This was a fracture of the tibia. I applied the wooden splint the first weeks of treatment, and afterwards the sole-leather boot. He sat in his chair every day after the third; he had a leg as sound and as good as the other in a short time.

"Mr. N. White, aged 60, on the 20th of Jan., 1830, fell from his carriage and broke the tibia and fibula near their middle. This was treated entirely according to your directions, with the wooden boot, or posterior splint, which I procured of you. The patient was taken from his bed the second day, and sat in his chair very comfortably every day afterwards; his recovery was unusually rapid. My last visit to him was the 14th of Feb. The leg was perfect, with the exception of being a little straighter than the other.

"I have since had many similar cases, which I have treated in the same way, with equal success. Have in all these cases permitted my patients to leave their beds daily."

From S. L. Richardson, M.D., of Jaffrey.—"I have made use of your apparatus for the fracture of the leg in three cases. G. U., of this town, received a fracture of the tibia and fibula, Oct. 30th, 1837. I applied your paste-board boot. D. Walton, Nov. 8, fractured his leg at the lower third; used the sole-leather boot. N. Thompson; fracture of the tibia about four inches above the ankle joint, and fibula at the same place, and again three or four inches above. These patients were allowed to sit up when they pleased—and went about the house with crutches from some time in the course of the first week. Limbs all straight and perfect."

"I have used your composition splint in two cases of the fracture of the radius and dislocation of the ulna forward, with the most perfect success."

FRACTURE OF THE FORE-ARM.

The apparatus for the fracture of the arm is a composition, above alluded to, of paper and cloth, formed on moulds of the shape of the limb, including the hand. When dry and covered with a sufficient coat of varnish, it forms a flexible and convenient *case* for the arm.

Application.—Wrap a piece of cotton cloth around the arm; over this, on either side, place a longitudinal compress to preserve the interosseous space, and over these apply the splint, which may be confined by bandage or elastic tapes.

In the *fracture of the radius and dislocation forward of the ulna*, a

firm compress should be placed under the lower extremity of the latter bone, to support it in its place. The latter accident is one of frequent occurrence, yet we rarely find it alluded to by authors.

When a person falls and throws out his hand, he receives the impetus upon the radius, which, if fractured near its lower extremity, is turned back, while the ulna not being resisted in its direction ruptures the ligaments which confined it to the radius. It is important here to fulfil two indications—viz., to bring down or forward the inferior fragment of the radius, and retain it in a line with the superior; and to support the ulna in its place on the radius. To effect this double object, I have contrived the instrument (fig. 5) called the *ulna supporter*.

In its application, the expanded end is placed over a sufficient compress or splint, on the inferior end of the radius, and the pad, *b*, of the screw of the other end is to be placed, anteriorly, on the lower extremity of the ulna. The screw is now turned, which forces the ulna upwards, while it depresses the radius. By turning down the thumb-nut, *c*, the screw is fixed in the slide. To prevent accidental displacement of the instrument, a tape, fixed in the loop hole of the radial end, may be tied to the other, near the screw. When the instrument is thus fixed on the wrist, the arm cannot be rotated, and no further apparatus and dressings will be needed, unless it be to give support to the arm in a sling.

The pressure of the instrument will cause no irritation, if sufficient compresses be used, before it is applied. No bandage is required in this case, nor can it be used in fractures of the fore arm or of the leg unless over splints sufficient to prevent its causing the approximation of the bones.

Another suggestion may not be wholly unimportant, especially to junior practitioners, viz., that there should be extreme caution in the use of bandages in cases of fractures of the upper extremities of aged persons. Any restraint to the motion of the fingers and to the vascular circulation of the arm, will cause the hand and fingers to swell, their ligaments to become rigid, and often ossific deposits to be made in their joints. Similar evils will follow the use of the *wedge* in fractures of the clavicle. The contractions of the muscles are weak in aged persons, and there would not often be much deformity in the fractures of their superior extremities, if the necessary apparatus were loosely applied; and even if there were a little deformity, it would be far better for the patient than the effects of an opposite practice. The flexible splint above described, or one of similar form made of leather or other suitable material, could be used in such cases, so as to give all desirable support to the limb, without causing these pernicious effects.

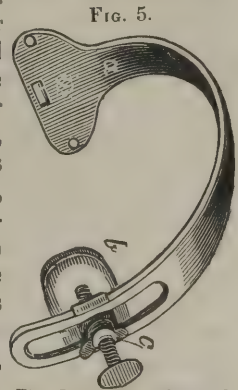


FIG. 5.—*a*, the radial end.
b, the ulna pad. *c*, the thumb nut to fix the screw in the slide.

DISLOCATIONS.

In cases where considerable force becomes necessary in the reduction of luxations of the humerus, and in all cases of the femur, Sir Astley

Cooper prefers the pulley to manual assistance, as the force of extension exerted by the former is gradual and unyielding, while that of the latter is unsteady, uncertain, and, after a short time, diminishing. It is well known that muscles will resist rough and unsteady extension, while by a gradual, and even less force, they may be soothed into a compliance.

In dislocations of the humerus into the axilla, the case would be very rare when any other force would be required in its reduction than could be exerted by the surgeon in the manner practised by Sir Astley. At least I have never found one which was not easily reduced by laying the patient on his back, placing my heel or foot in the axilla, and making extension from the wrist, during the many years I have adopted this method. In addition to Sir Astley's directions, I have usually requested the patient to take hold of the elbow with his other hand and draw it to his side. This has the double operation of diverting the mind of the patient from the extended muscles, and of making a lever of the humerus to bring it into its place.

But some cases of luxations may occur to every surgeon, where his best-directed efforts will fail of success without the aid of additional force. In such cases, I would suggest the expediency of not calling in the aid of manual assistance, when he can avail himself of the advantages of the mechanical powers.

By the *ratchet-wheel windlass* (fig. 1) any desirable force can be exerted, and with more facility than by pulleys. It can be used when the patient is placed in any convenient posture. The following, perhaps, would be the most practicable:—place the patient on his back on a bed, and screw the machine to the foot-piece of the bed; split a piece of firm cloth or leather, through which the arm is to be passed, so as to have one part apply to a cushion in the axilla, and the other, made somewhat shorter, to the acromion; connect this to a strap fixed to the head-board; wrap a towel round the arm above the elbow, over which fix another towel or any convenient band, to which the cord of the machine is to be connected. Everything being adjusted, make the extension in a slow and gradual manner, directing the patient at the same time to pull at something with the other arm, or to attempt to draw his elbow to his side, thereby making of it a lever—the cushion in the axilla being the fulcrum over which it would act. If the bone does not return to its place, let the extension remain the same for some minutes, while the muscles are soothed by gentle friction. Again carry the extension further; at the same time direct the patient to attempt to rise, or change his position by placing his body in a greater angle with the extended humerus, when the reduction will probably be immediately effected, but not with the usual report, therefore care should be taken that extension be discontinued when the head of the bone is carried over the edge of the socket. When the luxation is forward or backward, we have only to vary the direction of the extension, as would be proper by other methods.

It will be perceived that by this machine the surgeon, as is very desirable, does all that is, or ought to be done, in his own time; possessing the power and facility by mechanical and constitutional means of com-

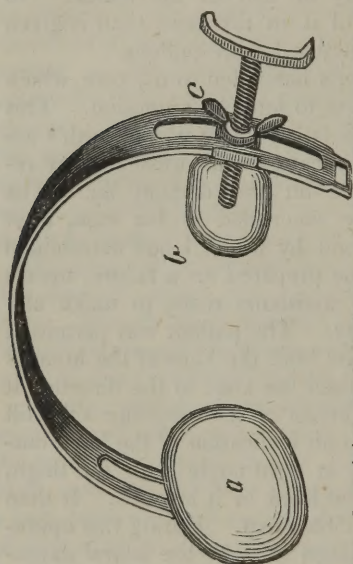
manding success ; for while extension is continued he may administer medicine or let blood if necessary. And what is not unworthy the consideration of the surgeon, it would be more for his credit to have alone performed the operation, than to have been a mere director of the manual force which had accomplished it.

This machine would be equally useful in other luxations requiring considerable extending power—especially in that of the femur. No other rules need be given for the use of it in this case, than is given above and in the books, for effecting reduction by the pulleys.

But one case of luxation of the os femoris has fallen to my care, which I was able to reduce without a recourse to forcible extension. This occurred about 20 years since, when the late Prof. Nathan Smith's account of the reduction of a similar dislocation was fresh in my recollection. It was a luxation upwards on the dorsum ilii. The method by which Dr. Smith ultimately succeeded in his case, after fruitless attempts by extension, was the one by which I had determined to attempt reduction ; but that I might be prepared for a failure, towels and bands were applied as usual, with assistants ready to make any extension which might be found necessary. The patient was permitted to lie on his back on the bed where I found him, the knee of the luxated limb turned in and over the other. I raised the knee in the direction it inclined to take, which was towards the breast of the opposite side, till the descent of the head of the bone gave an inclination of the knee outwards, when I made use of the leg, being at right angle with the thigh, as a lever to rotate the latter and turn the head of it inwards. It then readily returned to its socket, with an audible snap. During this operation the two assistants who had been placed to make the lateral extension and counter-extension, if ultimately required, were directed to draw moderately at their towels. How much of the success of the operation is to be imputed to their extension, and the rotation of the thigh by the leg, I am unable to determine ; but as Dr. Smith succeeded without the aid of either, and as the head of the femur seemed to descend by an easy and natural process, I am inclined to believe that all that is necessary in such cases, is to elevate the knee, when the ilium, the muscles attached to it, and perhaps the ligaments, become the natural fulcrum, over which the thigh, as a lever, acts to bring the head down and inwards into the socket. Indeed it would be in vain to attempt to bring the head of the bone into its place until it had presented itself to the socket, by any power whatever, as was fully illustrated in the case recorded in the French *Lancet* and elsewhere. In this case of dislocation of the thigh, dating seven months and a half, after powerful and continued extension for several days, and “when the head of the femur was brought down to a level with the acetabulum, the extended force was suspended, and the two assistants having bent the leg on the thigh, were directed to rotate the latter from without inwards ; during this manœuvre the femur was broke across at the lower third.”

SEMI-CIRCULAR TOURNIQUET.

Having procured an engraving of this instrument, we are induced to subjoin it to the above, although it belongs to another branch of surgery. The cut accurately illustrates its construction and application. *a*, the



posterior pad, the screw of which is fixed in the slide by a thumb-nut ; *c*, a similar thumb-nut to fix the screw of the arterial pad, *b*, in the slide, after the requisite pressure has been made by turning it down. The slides render the instrument applicable to limbs of various sizes. Straps may be fixed in the cross-fissures of its extremities, which being buckled round the limb will prevent accidental displacement.

It will be readily perceived that the operation of this instrument would be to effectually compress the artery on which the arterial pad is applied, and to leave the circulation of all the other vessels of the limb unimpeded. Hence hemorrhage could be suppressed by it for a long time when the appropriate operation is necessarily delayed. In the operation of amputation, it may be found convenient, and preferable to any other in cases where suitable assistants cannot

be obtained. In all cases of secondary hemorrhage, it would be found very useful. It can be applied higher on the femoral artery, than any other tourniquet ; even above Poupart's ligament on the external iliac. In the latter case the posterior pad would lie on the sacrum. Aneurism might, probably, in some cases be cured by its application, and in cases of punctured arteries, it might be prevented. Pressure by suitable compress and bandage would here be required, over the aneurismal or punctured part, while the circulation in the artery would be restrained by the use of the instrument higher up. This instrument, or a modification of it, might, perhaps, be successfully applied to varicose veins of the extremities.

These suggestions have not been dictated by a practical use of the instrument, and they will be received accordingly ; but if it has merits, they will be discovered and appreciated by the profession.

Jaffrey, N. H., May, 1840.

